show other canals, and Mr. Lampland is to be congratulated, in company with Mr. Lowell, upon thus securing unquestionable evidence of the actual existence of these features.

A point of special interest to planet observers is that whilst trying to obtain these photographs the observers found that the restriction of the aperture employed, by its elimination of the evil effects of atmospheric vibrations, more than counterbalanced the inconvenience caused by the diminution of light-gathering power and the consequent increase of the length of the exposures, a result which confirms the conclusion previously arrived at by Mr. Lowell from visual observations.

DUTCH OBSERVATIONS OF THE CORONA.—Parts iii. and iv. of Prof. Julius's report on the observations made by the Dutch expedition in Sumatra during the total solar eclipse of May 18, 1901, minutely describe the apparatus and the methods of procedure employed in examining the coronal radiations for polarisation effects and for the determination of the amount of heat radiated by the eclipsed sun.

A double-image polarimeter of the Cornu pattern, slightly modified, was employed to examine the polarisation at different points of an image of the corona. The points examined were situated at different distances from the sun's limb, and the position of each was carefully recorded. The results showed that the coronal rays were more strongly polarised at some distance from the limb than nearer to it, whilst at greater distances the polarisation again decreased. A discussion of some experiments, performed after the eclipse, on the depolarising effect of haze and clouds showed that this effect was practically negligible.

The observations of the total heat radiated by the eclipsed sun were made with a thermopile pointed directly to the corona, but clouds robbed the observations of any definite result. So far as they go, the resulting figures show that the heat radiated at totality is not so great as that received from the full moon, and that a very striking increase occurred after the third contact.

THE NORTH POLAR SNOW-CAP ON MARS, 1904-5.—Observations of the north polar cap of Mars were made at the Lowell Observatory by Messrs. Lowell and Lampland during the period November, 1904, to May, 1905, and the observers' notes for each night are given in full in No. 20 of the *Lowell Observatory Bulletins.*

One remarkable feature observed was a white collar which surrounded the cap during the latter half of January. Mr. Lowell explains this phenomenon by the conjecture that it is a belt of spring haze which surrounds the cap during the hotter months of the melting, the cap proper being bordered by a blue belt of material (probably water) produced by the melting of the snow. Several subsidiary patches of snow were left behind by the receding polar cap, and became prominent features.

Of these, one in longitude 206° was especially marked, and was recorded in exactly the same longitude by Schiaparelli in 1888, and independently at the Flagstaff Observatory in 1901 and 1903.

VEGETATION AND THE SUN-SPOT PERIOD.—Since 1871 M. Camille Flammarion has each year recorded the dates on which the chestnut trees in the avenue of the Paris Observatory have burst into leaf and flowered. Plotting the results of his observations with the sun-spot curve on the same year-scale, he found that the variation of the dates of the different phases of the annual arboreal phenomena agreed very closely with the latter curve, the leaf-buds bursting and the flowers appearing earlier at those epochs when the sun-spot *maxima* occurred. The details of the observations and the method employed in reducing them are given in the July number of the *Bulletin de la Société astronomique de France.*

VISIBILITY OF THE DARK HEMISPHERE OF VENUS.—In a paper on the influence of the solar-activity variations on the planets, M. Hansky directs attention to the greater visibility of the dark hemisphere of Venus during epochs of maximum solar activity. According to the theory of Arrhenius, electrified ions emitted by the sun cause the phenomena of terrestrial magnetic storms and auroræ. Applying the same theory in the case of Venus, M. Hansky suggests that during the periods of solar maxima the dense atmosphere of that planet is rendered more phosphorescent, and, therefore, more easily visible, by the increased solar activity. He further suggests that, in order to test this theory, astronomers should observe the planet as often as possible during the present sun-spot maximum (*Bulletin de la Société astronomique de France,* July).

DETERMINATIONS OF METEOR RADIANTS.—Some interesting results of meteor observations are recorded in No. 4032 of the *Astronomische Nachrichten* by M. Eginitis, of Athens, and by Prof. A. A. Nijland, of Utrecht.

M. Eginitis observed the Perseid, Leonid, and Andromedid showers of 1903 and the Perseid shower of 1904. He gives the time of observation, the number, colour, magnitude and relative velocity of the meteors recorded, and the position of the determined radiant on each date, directing special attention to any objects which were, for any reason, extraordinary. On August 11, 1904, several meteors were seen to proceed from a radiant near to α Persei, and these were, in general, whiter and brighter than those from η Persei, the latter being fainter and of a reddish-yellow colour, and generally falling in pairs.

Prof. Nijland's results deal with the Lyrid, Perseid, and Leonid showers of 1902, 1903, and 1904, and he gives the results for each night of observation and the positions deduced for the respective radiants.

THE INSTITUTION OF NAVAL ARCHITECTS.

THE summer meeting of the Institution of Naval Architects was held last week in London, the usual sittings for the reading of papers taking place in the theatre of the Society of Arts. The following papers were on the programme for reading and discussion:—Tactics and strategy at the time of Trafalgar, by Admiral Sir Cyprian Bridge; the ships of the Royal Navy as they existed at the time of Trafalgar, by Sir Philip Watts, Director of Naval Construction; the classification of merchant shipping, illustrated by a short history of Lloyd's Register, by H. J. Cornish, chief ship surveyor to Lloyd's Register; experiments with models of constant length and form of cross section, but with varying breadths and draughts, by Lieut.-Colonel B. Rota, Royal Italian Navy; experiments upon the effect of water on speed having special reference to destroyers recently built, by Harold Yarrow; deductions from recent and former experiments on the influence of the depth of water on speed, by W. W. Marriner; the failure of some large boiler plates, by J. T. Milton, chief engineer surveyor to Lloyd's Register; a comparison of the performances of turbines and reciprocating engines in the Midland Railway Company's steamers, by William Gray.

It was also arranged that visits should be paid to the following works:—Siemens Bros. and Co.'s Telegraph and Electrical Instrument Works, near Woolwich; Vickers, Sons and Maxim Ordnance Works, Erith; J. and E. Hall's Refrigerating Machinery Works, Dartford; Yarrow and Co.'s ship-building yard and marine engine works, Poplar; John I. Thornycroft and Co.'s ship-building yard, marine engine works, and motor-car works, Chiswick. Visits were also paid to the P. and O. mail steamer *India,* lying in the Tilbury Docks, and H.M.S. *Black Prince,* built by the Thames Iron Works, and lying in the Victoria Docks. The last day of the meeting, Friday, July 21, was occupied by a visit to Portsmouth Dockyard.

The first sitting during the meeting, when the three first papers on the list were presented, was held on Wednesday, July 19, the president of the institution, the Right Hon. the Earl of Glasgow, occupying the chair. These papers, as will be gathered by the titles, were chiefly of historical interest. In this centennial year of Trafalgar it was, no doubt, appropriate for the institution, which is so largely naval in its composition, to include in its programme papers of the nature of those contributed by Sir Cyprian Bridge and Sir Philip Watts; but how far they have any scientific bearing on naval strategy or tactics of the present day is a question that is evidently open to discussion. It would appear that a large section of naval officers hold that the lessons of the past era of masts and sails should be applied with little modification to the present day. For example, Admiral Sir Edmund Fremantle said that the tactics and strategy at the time of Trafalgar taught lessons which would never die, and Admiral Custance remarked that all the lessons of the past in naval warfare have a bearing on the present day, it being quite immaterial whether vessels were moved by steam or sail. On the other hand, there are some who hold that the disciples of what has been described as the "teachings-of-history" school carry their reverence for the past to an excessive degree, and that a too blind following of the tactics and strategy of the great admirals of the past may lead to disaster. Sir Philip Watts, in the course of his paper, pointed out that "steam propulsion, in all its various forms, shell fire, iron and steel armour, steel hulls, breech-loading and rifled guns, torpedoes, mines, high explosives, electrical appliances, and submarines" have all been introduced since the day of Trafalgar; and though he did not press any moral from these changes, his predecessor at the Admiralty was a little more explicit, as it was possible for one no longer trammelled by the rules or etiquette of office to be. Sir William White said in the discussion that while he agreed with Sir Cyprian Bridge that the teachings of history were valuable, it was necessary to allow for changes brought about by time. He did not think such a course was followed on all occasions.

Mr. Cornish's paper, as a record of the past by a competent authority, is one which should prove of considerable value to the student and historian of ship-building. The author did not urge its reading as time was short, and it was accordingly taken as read.

Colonel Rota's paper was the first taken at the evening sitting of Wednesday, July 19. It formed but a part of a very big subject, and was in the nature of an addition to Mr. R. E. Froude's paper on model experiments, read last year. The experiments briefly described by Colonel Rota were made with five models at the Royal Italian Dockyard, Spezia. It would be difficult to give the results of the inquiry without going into the whole question, but it may be stated that the author, without attempting to draw any general deduction, has practically concluded that in the unlimited series of forms which may be derived from a given form of hull by changing the vertical and horizontal cross sections scale—provided that the area of cross sections remains constant—there is a range of ratio of beam to draught, very close to that corresponding to the least wetted surface, within the limits of which there is not any sensible variation in the value of the resistance constant, that is, the corresponding E.H.P. There was no discussion on this paper, but Sir William White had written to Mr. Dana, the secretary, endorsing the author's plea for the publication of results of a purely scientific nature.

The two papers contributed respectively by Mr. Harold Yarrow and Mr. W. W. Marriner were no doubt the chief attraction during the meeting, and the little theatre of the Society of Arts was crowded to its full capacity by those anxious to benefit by the investigations carried out by Messrs. Yarrow and Co. Both papers referred to the same experiments, the authors having been engaged together on the work. Mr. Marriner, as is well known, is the chief of Messrs. Yarrow's scientific staff, whilst Mr. Harold Yarrow is still a student of the institution, and it is worth noting that his paper is the first contribution to the *Transactions* by a student. The data given possesses the merit of being both of scientific and practical interest. It has for some time past been recognised that depth of water has a considerable influence on the speed of steam ships, and Government contractors have lost considerable sums of money through failure to attain speed on the official measured miles. The scientific interest of the subject is unlimited, the problem involving the study of the natural laws governing wave-making and fluid resistance. It is to be hoped that ship builders and ship owners—now they have had placed before them so striking an example of the value of scientific research upon the practical results at which they aim—will do something tangible to help forward an inquiry into the influence of physical laws upon the resistance of vessels progressing in water. It is not creditable to the ship owners and ship builders that they should be beholden to the generosity of a private firm of torpedo-boat builders for information on these points, especially as such information cannot be obtained without the expenditure of several hundreds of pounds. The exclusive knowledge of the facts set forth in the two papers would prove a valuable asset to Messrs. Yarrow and Co. by giving them a distinct advantage over their competitors, and it is therefore more creditable to them that they have made the details public. It is, however, the greatest reproach of all to us, as the leading maritime nation, that Mr. Yarrow should have been under obligation to a German ship-owning firm for the facilities needed to make the investigation complete. Had it not been for the hospitality of their experimental tank offered by the North German Lloyd Company, the valuable information now at the command of ship designers would not have been forthcoming, for there is no tank of the same nature in this country which could have been used.

The experiments upon which the two papers were founded arose through Messrs. Yarrow and Co. having failed to get the contract speed of 25½ knots with destroyers built for the Royal Navy when they were tried on the Maplin mile off the mouth of the Thames. The builders, anticipating that the limitation in depth of water was accountable for the want of success, surveyed on their own account a mile near Dover, the section posts being placed on the cliffs. Here, in a greater depth of water —50 feet at low tide—the contract speed was reached, the vessels running a great part of the time in quite deep water outside the Goodwins. It should be explained that the trials last over four hours, and only six runs are made on the measured mile. On these six runs is found the number of revolutions needed to cover a mile, and then by counting the revolutions the distance steamed can be known. Although the contract was fulfilled, the results were not altogether satisfactory to the contractors, and Mr. Yarrow determined to have tank experiments made, testing a model of the destroyer at depths corresponding to 20 feet, 30 feet, 45 feet, 60 feet, and 90 feet respectively. The results were shown by diagrams thrown on the screen by the lantern, there being curves for speeds and for effective horse-power at the above depths. The results were somewhat remarkable. Each curve showed a distinct hump, indicating that when a certain speed was reached the power needed for an increased speed rose with enormous rapidity. This, of course, was in accordance with previous experience, and it was also to be expected, as shown by the diagram, that the hump would occur at lower speeds with shallower water; thus at 20 feet depth the top of the hump was at about 16 knots, at 45 feet it was about 20 to 21 knots, and at 90 feet the steepest part was from 20 to 24 knots. As the depth increased the curve became fairer.

The interesting feature brought out, however, was the fact that at a certain speed, depending on the depth of water, for a time the power decreased as the speed advanced. Thus in a depth of 20 feet, at a speed of about 15¾ knots, 2000 horse-power was needed; when the speed had been increased by approximately another knot the power developed was about the same, whilst at 17½ knots the demand for power had fallen off appreciably, and it was not until 18 knots was reached that the 2000 horse-power was again required, and after this the curve rose steadily. With a depth of 30 feet the descent of the curve was even more marked, about 2500 horse-power being needed for approximately 17½ knots and for 20 knots also. Comparing the powers required for speeds at different depths, we find also some remarkable results. At 18 knots 2500 horse-power was needed when the water was 30 feet deep, whilst when it was but 20 feet only 2000 horse-power had to be developed to reach the same speed, thus reversing the popular idea that the deeper the water the easier the boat would run. Again, at 20 knots, and when the water was 20 feet (and also when the depth was about 30 feet—the two curves approximately coinciding here), 2500 horse-power was needed, but to get the same speed with a depth of 45 feet about 315 horse-power was needed. Passing at once to the higher speed of 26 knots, we find that the highest power is needed when the boat is steaming in deepest water. After crossing and re-crossing each other, the curves for four depths (20 feet, 30 feet, 45 feet, and 60 feet) come fairly well together, having got over all the humps at about 25 knots, where there is a range of about 200 horse-power. The curve for 90 feet of water is, however, for 5000 horse-power at 26 feet, or about 500 horse-power above the next highest curve. It would therefore pay better, according to these model experiments, to run a 26-knot trial of a destroyer in a depth of 20 feet to 60 feet rather than at a depth of 90 feet; the saving in power for the given speed due to the use of shallower water would be about 600 to 700 horse-power.

We have been obliged to depart from the text of Mr. Harold Yarrow's paper in order to give the facts contained in his diagram. Limits of space prevent detailed reference to other particulars brought forward by these suggestive trials, but enough has doubtless been said to show their interest and the wide field for further investigation that is afforded by the numerical data now at command. It will be remembered, as Mr. Harold Yarrow pointed out, that the tank experiments were made in the usual way without propellers, and this would doubtless have a considerable influence on the results; but possibly a way may be found, as suggested by Sir William White, to add the propeller, and so bring the tank conditions more nearly akin to actual practice. It will be remembered that the late Mr. Froude proposed to run a propeller, worked by independent mechanism, at a speed of revolutions corresponding to that of actual practice, the model, of course, being towed by the carriage.

Mr. Marriner's investigation of the model results showed that they should, as Mr. Harold Yarrow said, "be accepted with caution." In order to check these tank data progressive trials were made with an actual destroyer on a carefully selected course off the mouth of the Thames. Four tugs were anchored to mark the course, which extended from the East Girdler buoy across the Tongue Sand to a point east of the extreme north-east point of the Tongue Spit. This gave water of depths varying between about 14 to 16 feet over the sand, and 100 to 102 feet in the Queen's Channel. The revolutions of the engines, the fore and aft inclination of the vessel, and the height of the stern wave were noted, indicator diagrams also being taken. The data thus obtained at varying mean speeds were given by means of diagrams thrown on the screen. We have not space to repeat all the records, but will take as an example the run made at a mean speed of about 22·2 knots, the steam pressure being 140 lb. In running from rather less than 50 feet depth into water of 20 feet, the revolutions increased from about 305 to more than 325; the inclination in a length of 20 feet decreased from approximately $5\frac{1}{2}$ inches to $4\frac{1}{4}$ or $4\frac{1}{2}$ inches; and the approximate height of the stern wave fell from 20 inches above the deck level to a little more than 10 inches below the deck level, or about 2 feet 6 inches. Naturally any increase or reduction of resistance to the vessel would be accompanied by increase or reduction in the rate of revolutions of the engine, the steam pressure being constant. Increased height of stern wave and greater inclination are also signs of increased resistance and a greater demand for horse-power.

It would be difficult to deal adequately with Mr. Marriner's paper within anything approaching the space we have at our disposal, and without the diagrams by which it was accompanied. We can only hope, therefore, to give an idea of its scope, and refer our readers to the original in the published *Transactions* of the institution. The contribution consisted of a discussion, on a scientific basis, of the results contained in the preceding paper, the size of waves made by a vessel in her passage being a measure of the power absorbed in their formation. As the height of the stern wave was seen to increase when the resistance of the ship increased abnormally, it was to be assumed that anything which tended to retard the formation of waves would reduce the loss from wave making. The author cited the work of W. Froude and his son, R. E. Froude, of Lord Kelvin, D. W. Taylor, of the United States Navy, and Prof. Horace Lamb. The formula for relation of length to speed of ordinary repeating waves in deep water was set forth, and also the more complicated equation for shallow water. The equation showing critical depth for speed and critical speed for depth was given, and the conclusion was drawn (supported by Scott Russell's equation for the solitary wave in canals) that "the wave at the critical speed changes from the repeating to something approaching the solitary type."

The author next considered the waves accompanying the vessel. Transverse waves should tend to become longer and longer for the same speed as the depth diminishes until, at the critical depth, these should be of the isolated type. In shallower water, past the critical depth, there would be no transverse wave corresponding to the critical depth. Actually as the waves became longer if they did not lengthen as rapidly as investigation would lead one to suppose they would be travelling faster than their natural speed, and must be dragged by the boat. The increased resistance on approaching humps in the curve supports this view. The isolated wave is non-repeating, and exists only under certain relations of depth to speed. After passing the critical point the transverse wave disappears, being replaced by confused water. The paper was accompanied by diagrams illustrating these points, and it was considered a fair deduction that the waves formed by a ship closely follow the laws of waves in open water. The effect of the vertical sides of a canal in diminishing the loss of energy was pointed out by the author, and the manner in which the restricted width of a tank might have a similar effect was noted. The interference of the bow-wave system on the stern-wave system was discussed, it being shown that the union of the bow and stern waves (the crests coinciding) resulted in a large resultant wave which would carry away a great deal of energy. The velocity of diverging waves is much less than the speed of the vessel, speeds attained up to the present not being high enough for waves to approach the critical speeds for the depths in which vessels usually run. Diverging waves apparently constitute the principal wave-making resistance at speeds beyond the critical combinations of depths and speeds under consideration. The final conclusions of the author were as follows:—"(1) The critical combinations of depth and speed do not depend on the size of the vessel. (2) Of these critical combinations there is, for every vessel, one more serious than the others, and where this worst combination occurs depends largely on the length of the vessel. (3) The depth to be avoided is given by the equation $d = V^2/10$, and the resistance diminishes in both greater and lesser depths. The further away from this bad depth the better, especially on the deep side."

In the course of the discussion which followed the reading of these papers, Mr. A. F. Yarrow, in conformity with a suggestion made by Sir William White, proposed, and Mr. S. W. Barnaby seconded, a resolution that the Admiralty be urged to erect a measured mile, where ample depth might be found, in proximity to Chatham and the Thames. This resolution was put to the meeting by Sir John Durston, who occupied the chair, and was carried unanimously. It was but the logical outcome of the facts brought forward. The measured mile in the Clyde at Skelmorlie has ample depth of water, and is, as Sir William White said, the only satisfactory mile for high-speed trials; a fact which, it is acknowledged, gives the ship-builders of that district a manifest advantage over those of other centres. Mr. Barnaby stated that when a destroyer built by his firm, John I. Thornycroft and Co., was tried on the Skelmorlie mile an increase of speed of 1 knot was obtained over that reached under the best conditions on the Maplin mile, whilst an increase of 3 knots was reached as compared to running on the Maplin when the state of the tide was most unfavourable. Sir William White, in a letter to the secretary, read at the meeting, heartily endorsed the suggestion of a deep-water measured mile off the Thames. He also pointed out, with great regret, that it was necessary for Messrs. Yarrow to go to Germany for their tank experiments, and trusted that the fact might furnish a fresh incentive towards the establishment of a research tank at the National Physical Laboratory.

In the discussion on the technical details of the two papers, besides those mentioned, Mr. J. H. Narbeth, of the Admiralty, Mr. R. Saxton White, Captain Jackson, R.N., Controller of the Navy, Mr. W. H. Whiting, chief constructor, and Prof. Biles took part. Generally it may be said the views expressed by the authors were not disputed, although Sir William White did not quite agree with Mr. Marriner as to the importance the latter attached to the comparative narrowness of the tank.

On the Thursday's sitting Mr. Milton's paper on fractures in large steel boiler plates was read and briefly discussed. It gave particulars of the failures, the reasons for which could not be explained, of certain plates, and therefore were, naturally, attributed to "heat treatment." It is a term of exceeding comfort to the steel maker and the engineer alike, for the former is able to put the blame on the latter, and the latter to put the blame on the former, as no one can prove where the injudicious heat treatment occurred. The controversy is an old one, dating back, at any rate, to the days of the *Livadia's* boilers. Mr. Milton's paper is a suggestive contribution, and the facts he records may carry us some way towards a solution of the problem in the more or less distant future.

Mr. William Gray in his paper gave particulars of the performances of certain steamers fitted with Parsons' steam turbines. These were set forth in a table, which, as the author said, "treated the matter from a purely commercial standpoint." The discussion was largely of the same character.

The only remaining paper was not on the original programme, but was read at the conversazione which brought the proceedings to a conclusion on the Thursday evening. It was a contribution by Captain R. H. Bacon, R.N., entitled "Notes on the Causes of Accidents to Submarine Boats, and their Salvage." This paper, in harmony with the circumstances in which it was read, was of a popular nature, and was designed to show to the public at large that undue anxiety as to the safety of submarine boats is not warranted by the conditions under which they are employed. Dealing with the probability of water entering the hull through the hatch (the cause of four serious accidents through which these boats have foundered), the author pointed out that the fitting of another water-tight hatch at the base of the tower reduced the chance of accident in the future. The danger from grounding, he said, "was not very great," whilst the risk of the hull being crushed by the boat diving to too great depths argued the failure of the diving rudders, or too much water ballast. As to explosion through leakage of petrol, "in a properly designed system leaks should be practically non-existent." Another possible cause of explosion is due to hydrogen given off when batteries are being charged, but as this operation is carried on only when the boat is opened up for ventilation, "no danger exists." Altogether Captain Bacon's lecture was most reassuring, and it is pleasant to learn that his optimistic views are fully shared by his colleagues in the Service, both officers and men. The risk of sinking—involuntary sinking—being so small, it is of less consequence that only over a limited area near shore is it possible to recover a submarine boat once she has gone to the bottom. For this reason Captain Bacon considers it inadvisable that the Royal Navy should have a salvage plant of its own.

THE CONGRESS OF THE ROYAL INSTITUTE OF PUBLIC HEALTH.

THE congress of the Institute of Public Health, which this year was held in London under the presidency of the Marquis of Londonderry, attracted a large number of visitors, and much good work was done in the various sections which met at the Polytechnic and at King's College.

In a brief space it is impossible to deal adequately with the valuable discussions and papers read.

Sir James Crichton Browne, F.R.S., in his presidential address to the section of preventive medicine, chose as his subject the prevention of senility. It was, he declared, on the reduction of the death-rate that the potency of preventive medicine, as hitherto applied, stood forth conspicuously declared, and that the promise of its future sovereignty might be discerned. Fifty years ago the death-rate of England and Wales stood at 22·5 per 1000 persons; in 1903 it had dropped to 15·4—a fall of 7·1 per 1000, representing, on the estimated population of 1903, a saving of upwards of 223,000 lives per annum. As an exceptionally low rate of infant mortality had been maintained for two successive years, it might be hoped that the warnings uttered as regards infant hygiene, and more particularly infant feeding, were beginning to take effect.

It was, however, during the first half of life that the great fall in the death-rate had taken place. It was a remarkable fact that in men, at all ages from forty-five to seventy-five, there had been a startling rise in the death-rate, and that in women, from fifty-five upwards, it had been practically stationary. At the ages when we should have welcomed a rise in the death-rate, and at which only, in a hygienic Utopia, death ought to occur—eighty-five and upwards—it had fallen. Some of the nerve centres went on evolving until middle life, *e.g.* the hand and arm centres. He had ascertained that among certain classes of operatives in Birmingham the hand and arm centres did not reach their full maturity until about the thirtieth year. Similarly with the weavers of Bradford and the potters of Staffordshire. At about forty-five the productiveness of the manufactory hand generally began to diminish, and after that it contracted in an increasing ratio as time went on. The hand-failure of our operatives after forty-five was premature, and due to excessive wear and tear of the mechanism regulating manual movements. But there were other centres in the brain which, reaching maturity later, retained their power longer. Orators secured their greatest triumphs between forty-five and fifty-five, and it was with musical expression as with oratory.

The best antiseptic against senile decay was an active interest in human affairs, and those kept young longest who loved most. The natural evolution of our nerve centres was largely interfered with and too often arrested by unfavourable environment and deleterious habits of life or methods of work. It was a good working hypothesis that the natural life of man was one hundred, and that so far as it fell short of that it was "curtailed of fair proportion." Every man, he thought, was entitled to his century, and every woman to a century and a little more.

Dr. Francis Galton, F.R.S., in a paper on physical records, suggested that on February 29 in each leap year there should be school reunions at which there might be an opportunity for reviving early friendships, and at which, at the same time, the anthropometric and other records of the pupils might be added to.

Each old boy would be represented by an envelope stored in the school library. This would contain his anthropometric record to date, and he would be given printed forms, containing a few well considered questions—health, profession, preferments, marriage, children, and general remarks—and would be asked to forward the filled-in forms to the school.

Many papers were read on infantile mortality and on municipal milk depôts.

In the unavoidable absence of Sir William Broadbent, a discussion on sanatoria for consumptives was opened by Dr. T. N. Kelynack, physician to the Mount Vernon Hospital for Consumption. To illustrate the enormous economic waste to the community caused by pulmonary tuberculosis, Dr. Kelynack mentioned that in the metropolitan district alone 40,000 people died of the disease every year, and the monetary loss to London had been estimated at 4,000,000*l*.

The provision of adequate assistance for the consumptive poor demanded urgent attention. Sanatoria or hygienic hospitals undoubtedly secured the best conditions for the arrest and alleviation of the disease. At present we were just muddling along, with no satisfactory organisation of our resources and no rational cooperation.

A resolution was unanimously adopted urging the Government to appoint a commission to deal with the subject of the sanatorium treatment of the poor.

The presidential address in the section of chemistry and bacteriology was given by Prof. R. T. Hewlett. It was a plea for the recognition of the place of the specialist in the various departments of public health. Proper administration required a medical officer and his sanitary staff, a bacteriologist, a chemist, and an engineer, all working cordially together to a common end. For the smaller districts such a staff could be secured by grouping. Could they expect effective action if the medical officer was a